

Claims

What is claimed is:

- 5 1. A method of forming a semiconductor device,
 comprising:
 providing a substrate;
 forming a first layer of semiconductor material over
 the substrate;
10 removing a portion of the first layer to provide a
 layer offset between a removed portion of the first layer
 and a remaining portion of the first layer;
 forming an oxide layer of uniform thickness over the
 removed portion of the first layer and the remaining
15 portion of the first layer;
 planarizing the oxide layer so that the oxide layer
 over the remaining portion of the first layer is removed;
 forming a polysilicon region over the planarized
 oxide layer;
20 forming an epi region over the remaining portion of
 the first layer;
 forming a trench between the polysilicon region and
 the epi region extending vertically down to the oxide
 layer; and
25 depositing oxide in the trench down to the oxide
 layer to isolate the polysilicon region.
- 30 2. The method of claim 1, wherein the substrate is N-
 type semiconductor material.
3. The method of claim 1, wherein the first layer of
 semiconductor material receives N-type dopants.

4. The method of claim 1, wherein the step of removing a portion of the first layer includes the step of removing the first layer substantially down to the substrate.

5

5. The method of claim 1, further including the steps of:

forming a first well in the polysilicon region;

forming a second well in the first well;

10 forming a first transistor in the first well; and

forming a second transistor in the second well.

6. The method of claim 5, further including the steps of: forming a third well in the epi region; and

15 forming a power transistor in the third well.

7. A method of forming an integrated circuit having a driver device in proximity to a power device, comprising:

forming an oxide layer below the driver device;

20 forming a trench between the driver device and the power device, wherein the trench extends down to the oxide layer; and

depositing oxide in the trench down to the oxide layer to isolate the driver device from the power device.

25

8. The method of claim 7, further including the steps of:

providing a substrate;

30 forming a first layer of semiconductor material over the substrate;

removing a portion of the first layer to provide a layer offset between a removed portion of the first layer and a remaining portion of the first layer; and

forming the oxide layer having uniform thickness
over the removed portion of the first layer and the
remaining portion of the first layer.

5 9. The method of claim 8, further including the steps
of:

planarizing the oxide layer so that the oxide layer
over the remaining portion of the first layer is removed;
forming a polysilicon region over the planarized
10 oxide layer;

forming an epi region over the remaining portion of
the first layer; and

forming the trench between the polysilicon region
and the epi region extending vertically down to the oxide
15 layer.

10. The method of claim 9, wherein the first layer of
semiconductor material is an extension layer of the
substrate.

20 11. The method of claim 9, wherein the first layer of
semiconductor material is an epi layer.

25 12. The method of claim 9, further including the steps
of:

forming a first well in the polysilicon region;
forming a second well in the first well;
forming a first transistor in the first well; and
forming a second transistor in the second well.

30 13. The method of claim 12, further including the steps
of: forming a third well in the epi region; and
forming a power transistor in the well.

14. A semiconductor device having a driver device in proximity to a power device, the semiconductor device being made by the process comprising the steps of:

- 5 forming an oxide layer below the driver device;
 forming a trench between the driver device and the power device, wherein the trench extends down to the oxide layer; and
 depositing oxide in the trench down to the oxide
10 layer to isolate the driver device from the power device.

15. The semiconductor device of claim 14, wherein the process further includes the steps of:

- providing a substrate;
15 forming a first layer of semiconductor material over the substrate;
 removing a portion of the first layer to provide a layer offset between a removed portion of the first layer and a remaining portion of the first layer; and
20 forming the oxide layer having uniform thickness over the removed portion of the first layer and the remaining portion of the first layer.

16. The semiconductor device of claim 15, wherein the
25 process further includes the steps of:

- planarizing the oxide layer so that the oxide layer over the remaining portion of the first layer is removed;
 forming a polysilicon region over the planarized oxide layer;
30 forming an epi region over the remaining portion of the first layer; and
 forming the trench between the polysilicon region and the epi region extending vertically down to the oxide

layer.

17. A method of forming a first semiconductor device in proximity to a second semiconductor device on an

5 integrated circuit, comprising:

forming an oxide layer below the first semiconductor device;

10 forming a trench between the first and second semiconductor devices, wherein the trench extends down to the oxide layer; and

depositing oxide in the trench down to the oxide layer to isolate the first and second semiconductor devices.

15 18. The method of claim 17, further including the steps of:

providing a substrate;

forming a first layer of semiconductor material over the substrate;

20 removing a portion of the first layer to provide a layer offset between a removed portion of the first layer and a remaining portion of the first layer; and

25 forming the oxide layer having uniform thickness over the removed portion of the first layer and the remaining portion of the first layer.

19. The method of claim 18, further including the steps of:

30 planarizing the oxide layer so that the oxide layer over the remaining portion of the first layer is removed;

forming a polysilicon region over the planarized oxide layer;

forming an epi region over the remaining portion of

the first layer; and

forming the trench between the polysilicon region
and the epi region extending vertically down to the oxide
layer.

5

20. A semiconductor device, comprising:

a first semiconductor device;

a second semiconductor device physically proximate
and electrically coupled to the first semiconductor
device;

10

an oxide layer disposed below the first
semiconductor device; and

an oxide-filled trench disposed between the first
and second semiconductor devices, wherein the oxide-
filled trench extends down to the oxide layer to provide
isolation between the first and second semiconductor
devices.

15

21. The semiconductor device of claim 20, further
including:

20

a first well disposed above the oxide layer;

a second well disposed in the first well;

a first transistor formed in the first well; and

a second transistor formed in the second well.

25

22. The semiconductor device of claim 21, further
including:

a third well disposed opposite the trench from the
first well; and

30

a third transistor formed in the third well.

23. The semiconductor device of claim 20, wherein the
first and second transistors form a driver circuit.

24. The semiconductor device of claim 20, wherein the first and second transistors are thin film transistors.